MAJOR ARTICLE

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Detection of Acute and Established HIV Infections in Sexually Transmitted Disease Clinics in Guangxi, China: Implications for Screening and Prevention of HIV Infection

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Background. Human immunodeficiency virus (HIV) has spread throughout China and to some degree has penetrated the general heterosexual population in some regions.

Methods. A cross-sectional survey of 11,461 sexually transmitted disease (STD) clinic attendees in 8 cities in Guangxi, China, was conducted for syphilis and for acute and established HIV infections.

Results. The prevalence of acute and established HIV infections was 1.2% among the participants. Five acute (preseroconversion) HIV infections were detected. Multivariate analysis showed that HIV infection was independently related to unmarried status (odds ratio [OR], 1.73 [95% confidence interval {CI}, 1.00–2.99), less education (OR for less than primary school, 4.21 [90% CI, 1.21–14.58]), residence in city A (OR, 11.48 [95% CI, 2.05–64.31]) or city B (OR, 7.93 [95% CI, 1.75–35.91]), working in the entertainment industry (OR, 3.98 [95% CI, 1.14–13.88]), injection drug use (OR, 25.09 [95% CI, 10.43–60.39]), no condom use during most recent sexual intercourse (OR, 4.97 [95% CI, 1.38–17.88]), and syphilitic infection (OR, 1.91 [95% CI, 1.03–3.56]).

Conclusions. HIV prevalence in STD clinics is significantly greater than that in the general population, and subjects were identified who would be missed by conventional surveillance. China's nationwide system of public STD clinics, which reach down to the township level, should be used for HIV control programs.

China is confronting several HIV epidemics [1, 2] with distinct high-risk groups, including former plasma donors [3, 4], injection drug users [5], commercial sex workers [6, 7], and men who have sex with men [8]. Although injection drug use (IDU) has represented the most common mode of transmission to date [9], heterosexual HIV transmission is an increasingly important issue. The Chinese Ministry of Health (MOH)/Joint United Nations Programme on HIV/AIDS joint report from 2006 revealed that nearly half of all new HIV infections were related to heterosexual transmission [10]. In November 2006, the MOH announced that HIV had already spread to general heterosexual populations in several areas [11]. In some parts of China, >1% of pregnant women are infected with HIV [10, 12].

Social forces are transforming the scope and dangers of sex in China. A population-based survey showed that 9% of Chinese men had paid for sex during the last year [13], and a systematic review of the literature showed low rates of condom use [14]. Migration of historic proportions [15] has increased sexual risk among a subgroup of rural-to-urban migrants, who may serve as a bridging population for HIV transmission [16]. Several small studies indicate an increased risk of sexually transmitted infections (STIs) among rural-to-urban mi-

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Table 1. Demographic characteristics of the 8 cities included in the study.

City	Population	Urban residence permit, %	Cumulative reported HIV cases	GDP per capita, yuan	Special characteristics
City A	537,000	11	295	9337	Prefecture-level city in north-central region, an industrial and transportation hub; large no. of drug users; recent 100%-condom-use campaign immediately before the study
City B	986,500	88	4323	9337	Same as for city A
City C	953,000	17	NA	NA	County-level city in eastern Guangxi, near the border with Guangdong Province
City D	1,220,800	15	NA	4636	Southern city on the Gulf of Tonkin with a harbor and several railroads
City E	2,496,700	51	3145	7874	Central industrial city with multiple HIV programs and services, including the only free clinic
City F	1,750,200	13	570	2882	Southeastern city with a large river and port, previously affiliated with city G
City G	897,300	22	202	4160	Southeastern city bordering Guangdong Province
City H	557,900	47	93	NA	Southwestern city with an extensive coastline along the Gulf of Tonkin

NOTE. GDP, gross domestic product; NA, not available.

grants in China [17–20]. Major demographic changes have created "surplus men" (poor, unmarried males of low education), who are hypothesized to have an increased risk for STIs and HIV [21] but who are not well appreciated by current research methods or surveillance. Additionally, the overlap between the IDU and commercial sex work HIV epidemics in some parts of China increases the risk of heterosexual HIV spread [22, 23].

STIs, especially ulcerative diseases such as syphilis, facilitate the transmission of HIV infection [24]. Recent studies in North Carolina [25], California [26], India [27], and Malawi [28] suggest that sexually transmitted disease (STD) clinics are important sites for the evaluation of the prevalence of both established and acute, yet unrecognized, HIV infections. The STD clinic network coordinated by the China Centers for Disease Control and Prevention and the Institute of Dermatology systems operates in all 31 provinces, autonomous regions, and municipalities and reaches down to the local level. We undertook the present study to determine the prevalence and correlates of HIV and syphilitic infection among STD clinic attendees in Guangxi Autonomous Region (Guangxi).

PATIENTS, MATERIALS, AND METHODS

Study populations. A cross-sectional design was used to study STD clinic attendees at general-hospital STD clinics and devoted public STD clinics in Guangxi. Guangxi borders Vietnam and the Gulf of Tonkin to the south, Yunnan Province to the west, Guangdong Province to the east, and Guizhou and Hunan Provinces to the north. Guangxi has several major mountain ranges and rivers, and only recent highway projects have connected rural areas to major cities. The 47 million people of this autonomous region can be divided into 14 prefecture-level cities, 56 counties, 34 districts, 12 ethnic autonomous counties, and 7 county-level cities [29].

The health authority of Guangxi introduced this project to all 44 devoted public STD clinics, representing all major geographic regions, ethnic enclaves, and administrative levels; crossing major drug routes; and including the national and provincial border regions. Devoted public STD clinics were selected using a sampling method with population probability sampling of patient flow (measured by average number of daily clinic visitors). With the exclusion of areas >8 h from the capital by bus, the sample was designed to be representative of the entire population seeking public outpatient STD care in Guangxi. At each of the 10 cities selected, 1 general-hospital STD clinic and 1 devoted public STD clinic were invited to participate. A total of 14 clinics in 8 cities enrolled patients in the study (general-hospital STD clinics in 2 cities did not participated in the study). Cities with STD clinics in the study ranged in population from 0.54 to 2.5 million, with a mean size of 1.2 million residents (table 1).

From December 2004 until February 2006, potential study subjects were identified by staff at the selected STD clinics. Patients >18 years of age presenting for outpatient STD care who agreed to have their blood drawn for further study were eligible to participate. Patients who refused testing, were unwilling to give blood, were already in the study during a prior visit, or were unable to communicate effectively with local staff were excluded. During a 2-month period at each of the 8 sites, participants who fit the inclusion criteria but refused to participate in the study were documented for estimation of the refusal rate. The present study was approved by the Protection of the Rights of Human Subjects Institutional Review Board (IRB) at the Uni-

versity of North Carolina, Chapel Hill, and the Medical Ethics Committee at the National Center for STD Control and the Chinese Academy of Medical Sciences Institute of Dermatology at Nanjing.

Study procedures. All eligible subjects were offered free testing for syphilis if they allowed extra blood to be used for HIV and other tests. Those who agreed to participate in the study were given STI/HIV counseling after providing verbal informed consent. Demographic information, sexual behavior history, and an assessment of AIDS knowledge was obtained for each study participant via a questionnaire administered anonymously by clinic staff. Physicians obtained a medical history and performed targeted physical examinations to include genitals, lymph nodes, skin, and oropharynx. No identifying information was requested, and all qualitative data records were linked to blood samples by use of a bar-code system. The STD clinics were provided $1.33 for each validated questionnaire survey and blood sample.

All subjects received appropriate medical care for STIs. Each participant was informed that participation was voluntary, that their responses would be anonymous, and that they could refuse any part of the study. Venous blood samples were tested for HIV by ELISA (Vironostika HIV Uni-Form II Plus O; bioMérieux). For samples with positive ELISA results, a confirmatory Western blot assay (HIV Blot 2.2; Genelabs Diagnostics) was performed. Serum samples with negative ELISA results were pooled for testing by reverse-transcription polymerase chain reaction for detection of HIV RNA, as described elsewhere [25]. Serum samples from recruited patients were screened using a nontreponemal test (Toluidine Red Unheated Serum Test [TRUST]; Shanghai Rongsheng Biotech) and were confirmed using *Treponema pallidum* particle agglutination (Fujirebio) for samples with positive TRUST results. All HIV tests were performed and syphilis tests were repeated at the National STD Reference Laboratory in Nanjing, China.

Statistical analysis. Questionnaire and biological data were double entered and validated using EpiData software (version 3.1; EpiData Association). Univariate and multivariate analyses were performed using SPSS (version 11.0; SPSS). Univariate analysis was performed to assess the relationship between each variable (potential risk factor) and established HIV infection. Only variables that were significant at $P \leq .10$ were used in a multivariate logistic regression model for selecting significant variables. Outcome variables included the prevalence of (established or acute) HIV infections and odds ratios (ORs) and their 95% confidence intervals (CIs). $P \leq .05$ was considered to indicate statistical significance.

RESULTS

Univariate analysis. A total of 11,558 blood specimens were collected, for which 11,461 had qualitative data available that fit the inclusion criteria (figure 1). On the basis of the nonresponder data from 8 of the 16 sites, it was estimated that 1195 individuals (10.6%) chose not to participate. All cities participating in the study provided at least 1000 study subjects except city C. The ratio of male to female patients with STIs included in the study was 1.46:1, and males had a significant increased burden of HIV infection ($P = .05$) (table 2). The majority of subjects were married (69%), and one-fifth of the unmarried subjects were cohabitating. Unmarried status was significantly related to HIV infection (OR, 2.08 [95% CI, 1.47–2.95]). The mean age among men was 34.4 years (SD, 10.9 years); among women, it was 29.6 years (SD, 9.2 years). More than one-fifth of all subjects were 18 or 19 years old. Younger (<20 years) or older (>60 years) age groups had a higher rate of HIV infection than did the middle age groups ($P \leq .05$). Most subjects had a middle or high school education, although both illiterate people and those with graduate training were included in the population sample. Three levels of low education (illiterate, primary school, and middle school) in STD clinic patients were associated with HIV infection (OR, 5.09, 6.42, and 2.77, respectively).

A wide range of occupations was represented in the study sample. Working in the entertainment industry was borderline significant (OR, 2.15 [95% CI, 0.92–4.50]), and marking occupation as "other" was significantly associated with HIV infection (OR, 3.31 [95% CI, 1.46–7.49]). Two-thirds (78.3%) of all STD clinic patients were Han, and 21% of all subjects were Zhuang.

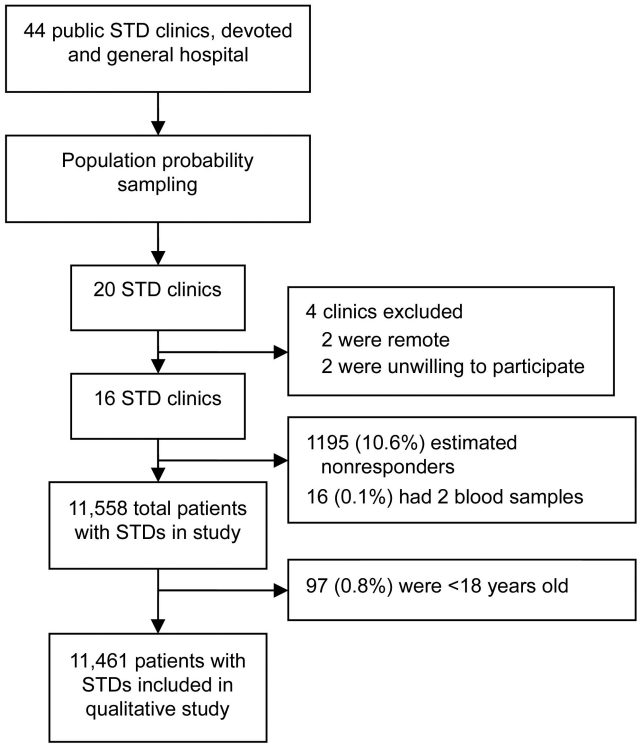

Figure 1. Method for selection of sexually transmitted disease (STD) clinics and patients.

Table 2. Univariate analysis of factors related to total HIV infections in patients with sexually transmitted diseases (STDs).

Factor	STD clinic population,[a] no. (%)	HIV infection, no (%[b])	*P*	OR (95% CI)
Total	11,461	133 (1.2)		
Sex				
Male	6391 (59.3)	90 (1.4)	.05	1.43 (1.00–2.07)
Female	4390 (40.7)	43 (1.0)		Reference
Marital status				
Single	3319 (31.3)	63 (1.9)	<.001	2.08 (1.47–2.95)
Married	7285 (68.7)	67 (0.9)		Reference
Age				
<20 years	823 (7.5)	15 (1.8)	.05	1.74 (1.01–3.00)
20–40 years	8148 (74.6)	96 (1.2)	.34	1.27 (0.08–2.10)
41–60 years	1730 (15.8)	19 (1.1)		Reference
>60 years	218 (2.0)	3 (1.4)	.03	2.61 (1.09–6.21)
Education				
Illiterate	79 (0.7)	2 (2.5)	.05	5.09 (1.01–25.6)
Primary school	851 (7.9)	27 (3.2)	<.01	6.42 (2.64–15.60)
Middle school	4811 (44.9)	67 (1.4)	.02	2.77 (1.20–6.40)
High school	3612 (33.7)	26 (0.7)	.44	1.42 (0.58–3.46)
College	1182 (11.0)	6 (0.5)		Reference
Postgraduate	177 (1.7)	3 (1.7)	.09	3.38 (0.84–13.6)
City				
City A	1035 (9.5)	50 (4.8)	<.001	22.0 (6.85–70.8)
City B	1507 (13.8)	32 (2.1)	<.001	9.42 (2.88–30.8)
City C	170 (1.6)	2 (1.2)	.07	5.17 (0.86–31.1)
City D	1148 (10.5)	13 (1.1)	.01	4.97 (1.41–17.5)
City E	1841 (16.9)	13 (0.7)	.08	3.09 (0.88–10.9)
City F	1588 (14.5)	9 (0.6)	.18	2.47 (0.67–9.16)
City G	2325 (21.3)	11 (0.5)	.27	2.06 (0.58–7.41)
City H	1305 (12.0)	3 (0.2)		Reference
Occupation				
Civil servant, technician, student	1316 (12.5)	10 (0.8)		Reference
Entertainment	742 (7.0)	12 (1.6)	.08	2.15 (0.92–4.50)
Farmer, laborer, service, self-employed, no job	7940 (75.2)	93 (1.2)	.19	1.55 (0.80–2.99)
Other	567 (5.4)	14 (2.5)	.04	3.31 (1.46–7.49)
Ethnicity				
Han	8274 (78.3)	73 (0.9)		Reference
Zhuang	2224 (21.0)	60 (2.7)	<.001	3.12 (2.21–4.40)
Sex partners				
One	4826 (44.5)	43 (0.9)		Reference
More than one	3078 (28.4)	63 (2.0)	<.001	2.32 (1.57–3.43)
Buy sex				
Yes	3497 (38.8)	60 (1.7)	.07	1.49 (0.97–2.28)
No	2842 (31.5)	33 (1.2)		Reference
Sell sex				
Yes	1106 (10.6)	20 (1.8)	.04	1.70 (1.03–2.81)
No	6433 (61.8)	69 (1.1)		Reference
IDU				
Yes	89 (0.8)	22 (24.7)	<.001	30.9 (18.4–51.9)
No	9597 (88.6)	101 (1.1)		Reference
Partner with IDU				
Yes	74 (0.7)	7 (9.5)	<.001	10.48 (4.64–23.7)
No	6785 (63.0)	67 (1.0)		Reference
Don't know	3274 (30.4)	49 (1.5)	.03	1.52 (1.05–2.21)
Syphilitic infection				
Yes	1293 (11.9)	23 (1.8)	.05	1.7 (1.00–2.47)
No	9626 (88.2)	110 (1.1)		Reference

NOTE. CI, confidence interval; IDU, injection drug use; OR, odds ratio.

[a] Totals may not sum to 11,461 because of missing values.

[b] Prevalence.

The patients of Zhuang ethnicity were significantly more likely to have HIV infection (OR, 3.12 [95% CI, 2.21–4.40]). Nearly all of those who responded (99.4%) reported being local and not from another area in Guangxi or neighboring provinces.

A total of 128 people with established HIV infection were detected in the Guangxi STD clinic population sample. An additional 5 acute HIV cases were discovered in this STD clinic population, representing 0.04% of all subjects and 3.8% of HIV cases. The overall prevalence of acute and established HIV infections was 1.2% (95% CI, 1.0–1.4%), and the rate in devoted public STD clinics (1.3%) was marginally higher than that in general-hospital STD clinics (0.8%) ($P = .069$). The prevalence of HIV infection varied considerably by city, ranging from 0.2% in city H to 4.8% in city A; 61.7% of all HIV-positive individuals were found in cities A and B. STD clinic patients in cities A (OR, 22.0 [95% CI, 6.85–70.8]), B (OR, 9.42 [95% CI, 2.88–30.8]), and D (OR, 4.97 [95% CI, 1.41–17.5]) were all at increased risk of HIV infection compared with patients in city H, who had the lowest HIV prevalence.

Information on HIV risk behavior was also collected as part of the study. Risk behaviors significantly related to HIV infection included lifetime multiple sex partners (OR, 2.32 [95% CI, 1.57–3.43]), selling sex (OR, 1.70 [95%, 1.03–2.81]), IDU (OR, 30.9 [95% CI, 18.4–51.9]), and IDU by a sex partner (OR, 10.48 [95% CI, 4.64–23.7]) (table 2). Reporting condom use, frequent social activity, and buying sex were not associated with HIV infection. A few male participants (0.3%) reported homosexual behavior, which was not associated with HIV infection.

Syphilitic infection was confirmed in 11.9% of study subjects. Syphilis was associated with HIV infection (OR, 1.7 [95% CI, 1.00–2.47]), and this association remained even when all drug users were removed. Among those with HIV infection, 20 (15%) had a genital ulcer on physical examination, and 23 (17%) had discharge on physical examination. Neither symptoms of ulcers or urethritis were significantly related to HIV status.

Multivariate analysis. In multivariate analysis, the following were independently related to established HIV infection (table 3)—unmarried status (OR, 1.73 [95%, 1.00–2.99]), less education (primary school or less) (OR, 4.21 [95% CI, 1.21–14.58]), living in city A (OR, 11.48 [95% CI, 2.05–64.31]) or city B (OR, 7.93 [95% CI, 1.75–35.91]), working in the entertainment industry (OR, 3.98 [95% CI, 1.14–13.88]), IDU (OR, 25.09 [95% CI, 10.43–60.39]), no condom use during most recent sexual intercourse (OR, 4.97 [95% CI, 1.38–17.88]), and syphilitic infection (OR, 1.91 [95% CI, 1.03–3.56]). Zhuang ethnicity fell out of the multivariate analysis, because this group had higher rates of drug use. Having multiple lifetime sex partners and partner drug use were associated with syphilitic infection and fell out of the multivariate model. Cities B and D were both associated with higher rates of drug use and partner drug use, making them not independently associated with HIV infection. Removal of acute HIV infection ($n = 5$ preseroconverters) from the analysis did not change the findings.

Acute HIV infection. Acute HIV infection is defined as detection of HIV RNA in blood plasma before seroconversion [30]. The 5 subjects with acute HIV infection were found in 3 cities: 2 from city A, 2 from city D, and 1 from city F. The viral concentration in the blood plasma of these 5 subjects ranged from 2714 to >750,000 copies/mL, with a mean of 309,524 copies/mL. Patients with acute HIV infection were younger (mean age, 24 years) than other patients with HIV infection. Acute HIV infection was detected in single (3/5) men (4/5) with a low education (3/5) and low income (5/5). All of the men with acute HIV infection reported purchasing sex and never using condoms; none reported drug use.

DISCUSSION

Although 183,733 cases of HIV infection have been detected in China to date, widespread HIV surveillance and case finding remains an elusive goal. The highest HIV prevalence in China has been among injection drug users, but the disease is rapidly spreading to heterosexual populations beyond traditional high-risk groups [10]. On the basis of the estimated 650,000 people living with HIV infections, the prevalence of HIV in the entire population of China is <0.05%. In the present study of STD clinic patients, we noted an overall HIV prevalence of 1.2%, >24-fold greater than that in the general population. The study sites were selected to represent different geographic regions and patient populations in southern China and represent 16.3% of the Guangxi population.

The present results are generally consistent with those of other small studies in China. One cross-sectional study of 2499 STD clinic attendees in the northwestern province of Xinjiang Autonomous Region found an HIV prevalence of 1.1% [31]. Similar to our study in Guangxi, the Xinjiang study found that minority status, occupation, syphilitic infection, and low education were associated with HIV infection. In a separate study from the north-central region of Guangxi, HIV prevalence was similar (2.1%) to that in the cities included in our study from same region (cities A and B), and a similarly high burden of syphilis was found (13%) [32]. The characteristics of the clinic patients are consistent with those in other reports and demonstrate a unique risk among young, poorly educated men [31, 33, 34] and among those with syphilis in certain regions.

China's imbalanced sex ratios have created a population of young, poor, unmarried men of low education who appear to have an increased sexual risk of HIV infection [17, 18, 33]. To our knowledge, this is the first study to find that unmarried status was independently associated with HIV infection in China, perhaps a harbinger of the emerging group of surplus men thought to be at increased risk for HIV infection. Although some research has found low prevalences of HIV and syphilis among groups of employed, unmarried migrant men in China [18, 35],

Table 3. Multivariate analysis of factors related to total HIV infections in patients with sexually transmitted diseases (STDs).

Factor	HIV infection, no (%[a])	*P*	OR (95% CI)
Total	133 (1.2)		
Marital status			
Single	63 (1.9)	.05	1.73 (1.00–2.99)
Married	67 (0.9)		Reference
Education			
Illiterate and primary school	29 (3.1)	.02	4.21 (1.21–14.58)
Middle or high school	93 (1.1)	.39	1.62 (0.54–4.86)
College	6 (0.5)		Reference
Postgraduate	3 (1.7)	.51	1.86 (0.30–11.61)
City			
City A	50 (4.8)	<.01	11.48 (2.05–64.31)
City B	32 (2.1)	<.01	7.93 (1.75–35.91)
City C	2 (1.2)	.11	5.47 (0.69–43.67)
City D	13 (1.1)	.12	3.42 (0.71–16.38)
City E	13 (0.7)	.04	5.06 (1.043–24.54)
City F	9 (0.6)	.22	2.76 (0.55–13.83)
City G	11 (0.5)	.34	2.21 (0.44–11.13)
City H	3 (0.2)		Reference
Occupation			
Civil servant, technician, student	10 (0.8)		Reference
Entertainment	12 (1.6)	.03	3.98 (1.14–13.88)
Farmer, laborer, service, self-employed, no job	93 (1.2)	.65	0.79 (0.29–2.19)
Other	14 (2.5)	.13	2.43 (0.77–7.67)
IDU			
Yes	22 (24.7)	<.001	25.09 (10.43–60.39)
No	101 (1.1)		Reference
Condom use			
Yes	8 (0.9)		Reference
No	70 (1.4)	.01	4.97 (1.38–17.88)
Syphilitic infection			
Yes	23 (1.8)	.04	1.91 (1.03–3.56)
No	110 (1.1)		Reference

NOTE. CI, confidence interval; IDU, injection drug use; OR, odds ratio.

[a] Prevalence.

these surveys have been conducted in regions with lower HIV prevalence and less drug use. The Guangxi STD clinic data reveals the potential contribution of surplus men to a generalized HIV epidemic in China and supports the concept that they have the money to purchase sex and engage in high-risk sexual behaviors. The demographic characteristics of the 5 patients with acute HIV infection (unmarried, poor, and young men) and other patients infected with HIV suggests the need for more studies and interventions focused on males at high risk in China.

High-risk networks and sexual dynamics are known to play an important role in HIV transmission [36], and this general trend was supported by significant variations in HIV prevalence by location. The highest HIV prevalence was found in the most rapidly industrializing region of the area (cities A and B), despite the conduct of a World Health Organization–sponsored 100%-condom-use campaign immediately preceding the study. Meanwhile, the next most industrialized region with substantial drug use (city E) had only one-sixth the number of HIV cases in STD clinics than city A (table 2). The successes of city E are likely related to the extensive governmental and nongovernmental support that makes HIV prevention, testing, and treatment widely available. In light of the rapid economic growth of China, expansion of HIV programs in industrializing regions will be important public health measures.

STIs amplify HIV transmission [24]. The remarkably high prevalence of syphilis among STD clinic attendees in this study emphasizes the gravity of China's multiple STI epidemics and their potential impact on expanded heterosexual HIV transmission. Syphilitic infections may be particularly important because genital ulcers (including syphilis) have been

strongly associated with incident HIV infections [37–39]. Our study found a significant association between HIV infection and syphilis and a substantial burden of STIs among those infected with HIV.

Recently it has been recognized that traditional surveillance for HIV by use of antibody tests will miss subjects with acute (preseroconversion) HIV infections. These people are particularly important to controlling the HIV epidemic because their high viral burden increases contagiousness [30]. Using a novel pooling strategy to detect HIV RNA in antibody-negative subjects, we found an additional 5 subjects (3.8%), consistent with the findings of many other studies [40].

The present study has several limitations worthy of further consideration. Population-based data [13] and several smaller studies [41–43] show that a substantial number of people with symptoms of an STI see private doctors or go directly to pharmacies, and these people might be at an increased risk of HIV infection and other STIs. Guangxi is not representative of the entire population of China but is more representative of provinces such as Yunnan, Sichuan, and Xinjiang. These provinces are characterized by large minority populations and major IDU routes of HIV transmission, which tend to have a higher HIV rate. According to government data, Guangxi had a total of 20,604 reported HIV infections, the third highest of any province in China [44]. Sex-worker sentinel-site HIV data from the provincial capital showed that ~8%–12% of sex workers were infected with HIV during the last 7 years and that this prevalence has increased over the last 3 years [45]. Guangxi's annual reported syphilis incidence of 22.0 cases/100,000 population is the fifth highest of any province or special metropolitan area in China [46].

Current HIV surveillance and reporting methods used to detect heterosexual HIV infection in China are probably not sufficient. In a 2004 report from 90 clinics (23,359 patients) at STI sentinel surveillance sites across China, only 49 patients with HIV infection were identified [45]. The national sentinel surveillance system for STIs includes regions without major STI epidemics or drug use, underestimating the extent of heterosexual HIV infections in some regions. Although the Chinese government has initiated a widespread mass-screening program to enhance case finding [47], this approach is expensive, has an issue of contention with respect to the violation of human rights [47], and is not linked to an existing system of clinical care.

Perhaps of greatest importance, the present results demonstrate the need for aggressive HIV screening in Chinese STD clinics. Early detection of people infected with HIV allows for life-saving medical care and critical prevention measures. The barrier to testing worldwide has been lack of resources and stigma [48], 2 issues that have been increasingly acknowledged in the Chinese response to HIV [49]. The Ministry of Health and the National Center for STD Control are discussing plans for a national syphilis control program. As HIV programs are scaled up and technical capacity grows in China, local public STD clinics provide an excellent location for targeted HIV prevention and treatment.

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